

SERVICE MANUAL



MODELS MT5500 & MT5500XL TRANSCEIVERS

marine

SECTION 1 INTRODUCTION

1.1 General

- a. The Regency Polaris MT5500 and MT5500XL Transceivers are all-transistor, FM devices for use in the VHF (156-163) marine band. The two versions, MT5500 and MT5500XL, are identical in circuit and component layout. The only difference is that Model MT5500XL has a rear panel toggle switch (S1) for selecting international channels (See 1.1f)
- b. The receiver is a computer-controlled, double-conversion, super-heterodyne type unit.
- c. The receiver can be programmed to scan any number of channels between two and twenty. See Owner's Manual for MT5500XL for programming details.
- d. A programmable Priority feature puts the priority channel at the beginning of the scan list. Channels are programmed with a keyboard. Any time a keyboard button is pressed, an audio "Beep" is heard to indicate that action has taken place.
- e. The transmitter is automatically set to the proper frequency for the channel indicated on the readout. The transmitter is disabled on all "receive only" channels, and when receiving weather transmissions.
- f. Both U.S. and International channels are available. On Model MT5500, the International channels are selected by clipping a Jumper (J301) on the Main PC Board Assembly. On Model MT5500XL, selection is by flipping a rear-panel toggle switch to INT position.

1.2 Specifications

Table 1-1 lists the specifications.

TABLE 1-1 Technical Specifications for Models MT5500 and MT5500XL Transceivers.

ANTENNA

Impedance: 50 Ohms

RECEIVER

Number of Channels: 64

Channel Types: U.S. and International

Type Selection: By clipping jumper J301 on Model MT5500; via
rear-panel toggle switch S1 on Model MT5500XL.

Sensitivity: 12 dB SINAD - - .35uv
20 dB Quieting - - .50uv

Selectivity Adjacent Channel: 70 dB (EIA SINAD)

Intermodulation Rejection: 70 dB

Image Response: 60 dB

Spurious Response: 70 dB

Modulation Acceptance Bandwidth: ± 7.5 KHz

Audio Output at 10% Distortion (3.2 OHm): 5 Watts

FCC Certification: Part 15, Subpart C

TRANSMITTER

Number of Channels: 54

Channel Types: U.S. and International

Type Selection: By clipping jumper J301 on Model MT5500; via
rear-panel toggle switch S1 on Model MT5500XL.

RF Power Output (at 13.8 VDC): 25 Watts

Spurious and Harmonic Suppression: -57 dB

Audio Frequency Distortion: 3%

Modulation Deviation - Adjustment Range: 0 - ± 7 KHz

FCC Emissions Designator: 16F3

FCC Transmitter Type Acceptance: Parts 2, 83

Frequency Stability: .001%

OPERATING ENVIRONMENT

Operating Temperature Range: -20°C to +50°C (-4°F to +122°F)

POWER REQUIREMENTS

Primary Power Input at 13.8 VDC

Transmit: 5 Amps

Receive: 1.3 Amps

Receive (squelched): 800 mA

Standby: 80 mA

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TABLE 1-1. Technical Specifications (Cont'd)

PHYSICAL

Dimensions: 6 1/2" (16.5 cm) x 2 3/4" (6.9 cm) x 10 3/4" (27.3 cm)

Weight: 4 1/2 lb. (2.1 Kg) approximately

The purpose of this document is to provide a detailed description of the technical specifications for the construction of a new bridge. The bridge is to be constructed over a river and will be used for the transport of vehicles and pedestrians. The bridge will be a concrete structure with a steel deck and will be supported by two large concrete piers. The bridge will be approximately 100 meters long and 10 meters wide. The bridge will be constructed in accordance with the following specifications:

1. The bridge will be constructed using concrete for the piers and deck, and steel for the deck and railings. The concrete will be of a minimum strength of 30 MPa. The steel will be of a minimum yield strength of 250 MPa. The bridge will be constructed in accordance with the following specifications:

2. The bridge will be constructed in accordance with the following specifications:

3. The bridge will be constructed in accordance with the following specifications:

4. The bridge will be constructed in accordance with the following specifications:

5. The bridge will be constructed in accordance with the following specifications:

SECTION 2 INSTALLATION

NOTE: Because of differences between individual marine craft and the special requirements of marine two-way antennas, it is recommended that the radio be installed by a qualified electronic technician experienced in marine two-way radio installations.

2.1 General

The MT5500 and MT5500XL Transceivers are designed for marine mobile installation in any vessel that has a 12 VDC negative ground system.

2.2 Mounting

The mounting bracket is designed to allow mounting the unit in a variety of positions in most craft. The mounting position of the unit should be selected to allow easy operation by the user. The bracket should be securely fastened to a solid surface to reduce possible damage due to excessive vibration.

2.3 Connections

Connect the red lead with the fuse holder to the positive (+) terminal of the battery, and the black lead to the battery negative (-) terminal. If the battery is remotely located, install additional wires.

NOTE: In order to retain the channels the user has entered into the scan list and the priority channel, the Transceiver must be connected directly to the boat battery (typical 0.08 Amps current drain). If the unit is not connected directly to the battery (i.e., ignition switch relay) there will be no adverse effect on the radio except for a loss of memory until re-programmed by the user. For programming, see Owner's Manual.

2.4 Programming for International Channels

- a. MT5500: MT5500, as received from the factory, is programmed for U.S. Maritime channels. To re-program for International Maritime channels, clip jumper J301 on Main PC Board Assembly (See Figure for jumper location).
- b. MT5500XL: To select International channels, flip the rear-panel toggle switch S1 to INT position.

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Section 1

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SECTION 3 OPERATION

3.1 Operating Principles

Figure 3-1 is a basic functional block diagram. The operation can be conveniently described under Transmitter (Sec. 3.1.1) and Receiver (Sec. 3.1.2). A schematic of the Transceiver is given in Figure 3-2.

3.1.1 Transmitter Operation:

3.1.1.1 Audio Section

a. Amplifier and Limiter

The audio speech is converted from air pressure variations to an electrical signal by the microphone which also pre-emphasizes the audio signal by 6 dB per octave. This signal is then applied to the first two operational amplifiers of IC401. The second amplifier amplifies and limits the audio signal to some voltage less than V_{CC} .

b. Low Pass Filter

After the audio signal is limited, it passes through a four-pole active low pass filter. This active filter consists of the third and fourth operational amplifiers of IC401 and its associated resistors and capacitors. The resultant signal is then limited with respect to side band splatter and has an 18 dB per octave roll-off above 3 KHz.

3.1.1.2 Phase-Locked Loop

a. Voltage Controlled Oscillator (VCO)

The oscillator consists of Q202, L201, C201, C202, C204, C205, C208, C210, CR201 and CR202. The frequency of the oscillator is determined by the voltage across CR202. This frequency is divided by either 15 or 16 by IC201. The resultant frequency is then divided by a programmable "N" (determined by the required carrier frequency) which results in a frequency close to 12,500 Hz. The primary supply voltage to the oscillator is regulated.

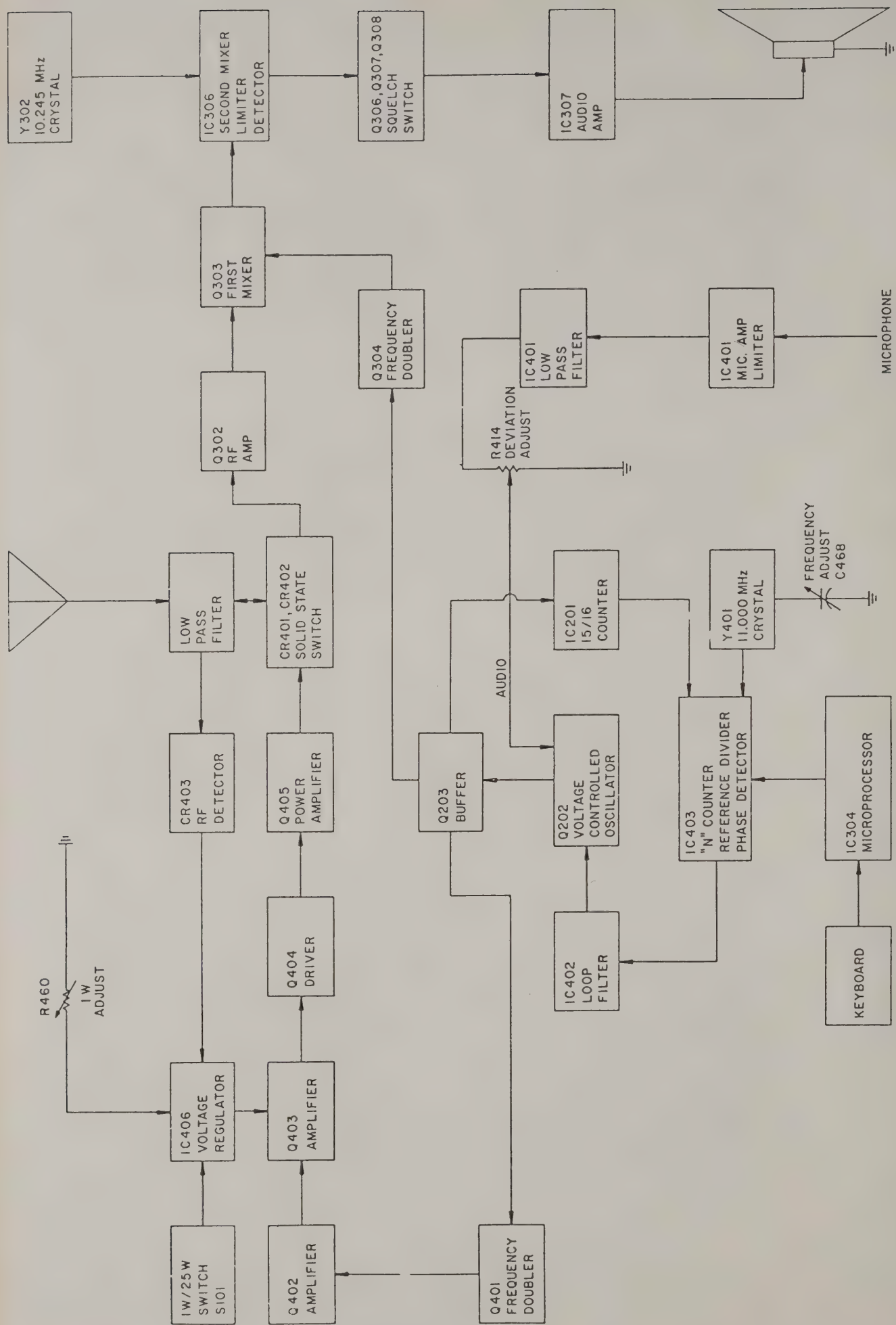


Figure 3-1. Functional Block Diagram of MT5500 and MT5500XL Transceivers.

1.1.2 Phase-Locked Loop (Continued)

b. Reference Oscillator

The oscillator consisting of Y401, IC403, C466, C467 and C468, is used for fine frequency adjustment. When used with the specified crystal type, the oscillator meets the required frequency stability without the need for a crystal oven or external compensation. The primary supply voltage to the oscillator is regulated. The reference oscillator frequency of 11.00 MHz is divided by 880 and the resultant frequency is 12,500 Hz.

c. Phase Detector

The exact 12,500 Hz signal from the reference oscillator circuitry is compared with the 12,500 Hz signal from the voltage controlled oscillator circuit, and the phase difference is detected. This phase difference results in an error voltage inside IC403.

d. Low Pass Filter

The error voltage from the phase detector is then amplified and filtered by IC402 and becomes the control voltage for the VCO. This voltage is applied to CR202 and changes the VCO frequency in a direction that reduces the phase difference between the reference oscillator frequency and the VCO frequency. When the loop is "LOCKED", the control voltage is such that the frequency of the VCO is exactly equal to the average frequency of the input signal from the reference oscillator.

3.1.1.3 Modulator

A varactor frequency modulator is used. The varactor, CR201, is series-coupled through C201 and C204 to the voltage controlled oscillator, VCO. By varying the voltage on the varactor diode at an audio rate, the resonant frequency of the VCO is varied. This results in the oscillator output being frequency-modulated at the audio frequency. The capacitance change versus voltage of the varactor is almost linear which results in low distortion. The frequency doubling stage, Q401, increases both the VCO frequency and the deviation to the desired value.

3.1.1.4

RF Power Amplifier

a. Frequency Multiplier Section

The input to Q401 is one-half ($1/2$) the carrier frequency. After passing through Q401, the signal is "rich" in harmonics of the input frequency. L401 and L402 are tuned to the carrier frequency. The carrier frequency is amplified by Q402.

b. Amplifier, Driver and Power Amplifier

The amplifier (Q403), the driver (Q404), and the power amplifier (Q405) stages, are used to amplify the carrier signal to the required output power. Impedance matching to 50 ohms is provided by L412, C452, C453, C454 and C455. The stages in this section operate in the Class C mode.

c. Receive/Transmit (R/T) Switch

During transmit, saturated switch Q410 is turned on, supplying forward biasing current for CR401 and CR402. When CR402 is biased "on", a short to ground is provided at this point which, through phase rotation in C457, L414 and C459, presents a high impedance to the RF path at CR401. This high impedance prevents the RF power from reaching the receiver. CR401 being turned "on" represents a low impedance allowing transmitter RF power to enter the low pass filter.

d. Low Pass Filter

This filter, composed of L415, L416, L417, C459, C460, C461 and C462, provides harmonic suppression.

e. 1 Watt Power Provision

The "1W/25W" switch on the Transceiver's front panel is used to select output power of less than one watt in the "1W" position, or full power output in the "25W" position. The RF Power is sampled via R441 and R442, detected by CR403 and filtered by C463. A DC voltage is supplied to IC406. In the 1W mode, the DC voltage to IC406 is raised by Q411, thereby causing the supply voltage

3.1.1.4 RF Power Amplifier (Continued)

to Q403 to be lowered. This lowered voltage to Q403 reduces the RF output power to less than 1 Watt.

3.1.2 Receiver Operation:

a. RF Amplifier

The receiver signal passes through the solid state R/T Switch to the input circuits of the RF amplifier (Q302). The circuits are broadbanded to cover the entire marine band. The output from the RF amplifier is coupled to the FET (Q203) mixer. Also coupled to the mixer is the injection frequency used to obtain the first IF frequency, 10.7 MHz. The frequency synthesizer generates a signal at one half of the required frequency. This frequency is multiplied to the correct frequency by the doubler stage, Q304.

b. IF Stage

The 10.7 MHz output from the mixer is passed through two 10.7 MHz crystal filters to obtain the desired selectivity. The signal from the filters is applied to Pin 18 of the IF integrated circuit, IC306. The IF circuit contains the second mixer. The injection frequency for the second mixer is obtained from a 10.245 MHz crystal connected between Pins 1 and 2. The resultant 455 KHz signal at Pin 3 is passed through a ceramic filter, CF301, and applied to amplifiers, limiters, and a quadrature detector contained in IC306. The audio output from the quadrature detector Pin 10 is applied to the audio amplifier and the squelch circuit.

c. Squelch Circuit

The input to the squelch circuit is restricted to high frequency audio, approximately 5 to 25 KHz, by the use of R and C components. The "noise" occurring in this range is amplified and detected by CR303. The DC voltage resulting from the detected "noise" is applied to the squelch switch circuit, Q306, Q308, Q309. When the "noise" is of sufficient amplitude, the audio is turned off.

3.1.2 Receiver Operation (Continued)

The receiver is muted. When a signal appears, the "noise" is reduced to a point where the detected signal is no longer sufficient to mute the audio. The audio is turned "on" and the audio amplifier is allowed to operate normally and deliver audio to the speaker.

d. Microprocessor (IC304)

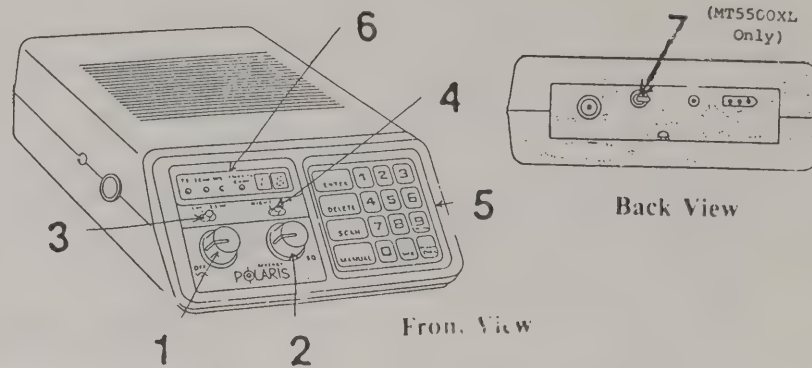
The microprocessor supplies the necessary frequency information to the frequency synthesizer to receive the desired channel. Information is also supplied to the digital readout to display the selected channel.

3.2 Operating Controls and Their Functions

Figure 3-3 shows the operating controls and also contains, in tabular form, a description of these controls. Also refer to the Owner's Manual for more details.

3.3 Operating Procedures

See Owner's Manual for detailed instructions.



ITEM CALLOUT NO.	PANEL DESIGNATION	DESCRIPTION	FUNCTION
1	OFF/VOL	S103 - R101 On-Off, Volume Switch	Clockwise rotation turns the unit on and increases the volume.
2	SQ	R102. Squelch Control Pot	Used for eliminating noise between stations and obtaining proper scan action. Turn control clockwise until noise is heard and the scanner stops. Turn control counter-clockwise until the noise just disappears and proper scanning action is obtained. NOTE: If the scanner stops on channels with no signal, turn squelch control counter-clockwise just enough to eliminate false stopping and restore proper scan operation.
3	1W/25W	S101. Two-position Slide Switch for antenna power selection	<u>25-Watt Position:</u> The Transmitter delivers full power to the antenna. <u>1-Watt Position:</u> The Transmitter output is reduced to 1 Watt. This reduces interference when operating close to the second station.
4	NIGHT-DAY	S102. Two-position Slide Switch for display/keyboard illumination	<u>NIGHT Position:</u> Display brightness is reduced and keyboard lighted. <u>DAY Position:</u> Display has maximum illumination and keyboard is not lighted.
5		Keyboard (Program Panel)	Used for selecting mode of operation and determining Receive and Transmit channels. NOTE: See Owner's Manual for Keyboard operation.
6		Display Panel	Indicates status of operations. <u>TX:</u> Red LED will light during transmission. <u>SCAN:</u> Yellow LED will flash rapidly during scanning. <u>WX:</u> Yellow LED will light when one of four weather channels is being monitored. <u>PRIORITY CHAN:</u> Yellow LED lights to indicate priority mode. <u>READOUT:</u> Channels to the right of Priority chan. appear as yellow digits.
7 (MT5500XL Only)	INT-US	S1. Toggle Switch for selecting types of channels	<u>INT Position:</u> Selects International Maritime channels. <u>US Position:</u> Selects U.S. Maritime channels.

Figure 3-3. Functions of Operating Controls.

SECTION 4 MAINTENANCE

4.1 General

- a. Maintenance of Models MT5500 and MT5500XL Transceivers consists of two principal tasks: transmitter alignment and receiver tuning. These procedures (Sections 4.4 and 4.5) require making adjustments and measurements on the PC Board Assemblies (See Figure 4-1 for location).
- b. The following equipment is required:
 1. DC Voltmeter
 2. RMS Voltmeter
 3. Oscilloscope
 4. RF Generator
 5. Frequency Counter

4.2 Accessing PC Board Assemblies

- a. Disconnect power.
- b. Remove five bottom screws holding case bottom to chassis. Lift off chassis.
- c. Remove case top (containing loudspeaker) by pushing from rear until released from chassis. Lift off top.

NOTE: Be careful not to break connections to loudspeaker while lifting. Let case top rest next to chassis.

4.3 Removal of PC Board Assemblies

First, get access by following above procedure (Sec. 4.2).

- a. Removal of Main PC Board:
 - (1) Remove all external connections.
NOTE: Be careful not to break or bend any pins.
 - (2) Detach six (6) screws holding PC Board to chassis bottom.
- b. Removal of VCO PC Board
 - (1) Remove all external connections.
 - (2) Detach four (4) screws holding PC Board to chassis.

4.3 Removal of PC Board Assemblies (Continued)

c. Removal of Control PC Board

- (1) Remove all external connections.
- (2) Detach four side screws holding front panel to chassis.
- (3) Remove screws attaching PC Board to front panel.

d. Assembly:

Reverse disassembly procedures.

4.4 Transmitter Alignment

a. This consists of three separate procedures:

- (1) Tuning
- (2) Transmitter Audio Alignment
- (3) Transmitter Frequency Adjustment

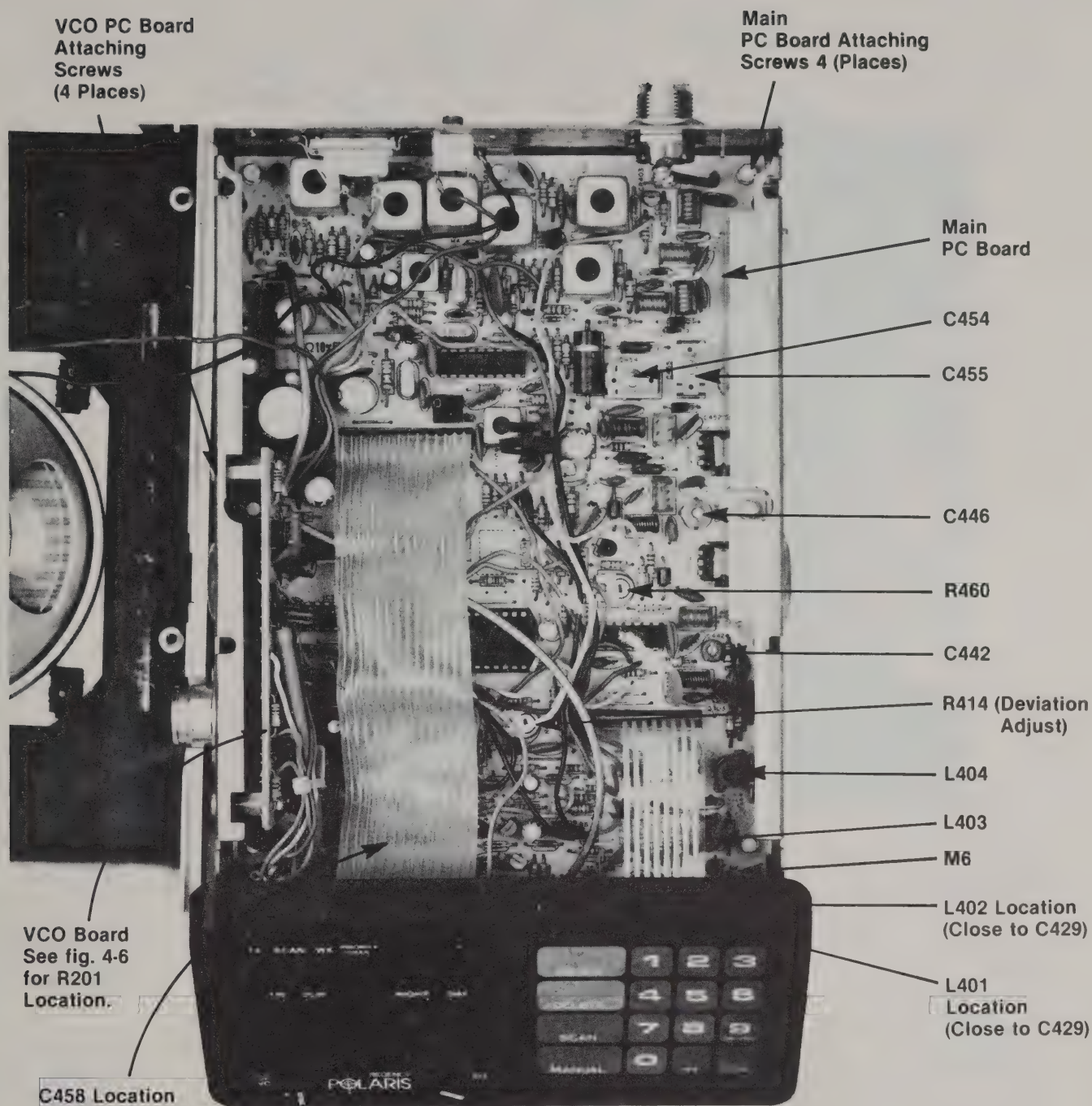
b. Refer to Figures 3-3, 4-1 and 4-2 for locations of components referred to in these procedures.

NOTE: Prior to the procedures, make the following adjustments:

Set the cores of L401, L402, L403 and L404 near the top of the coil form. Set S101 in 25W position, R460 to maximum clockwise position. Select Channel 16 on the keyboard.

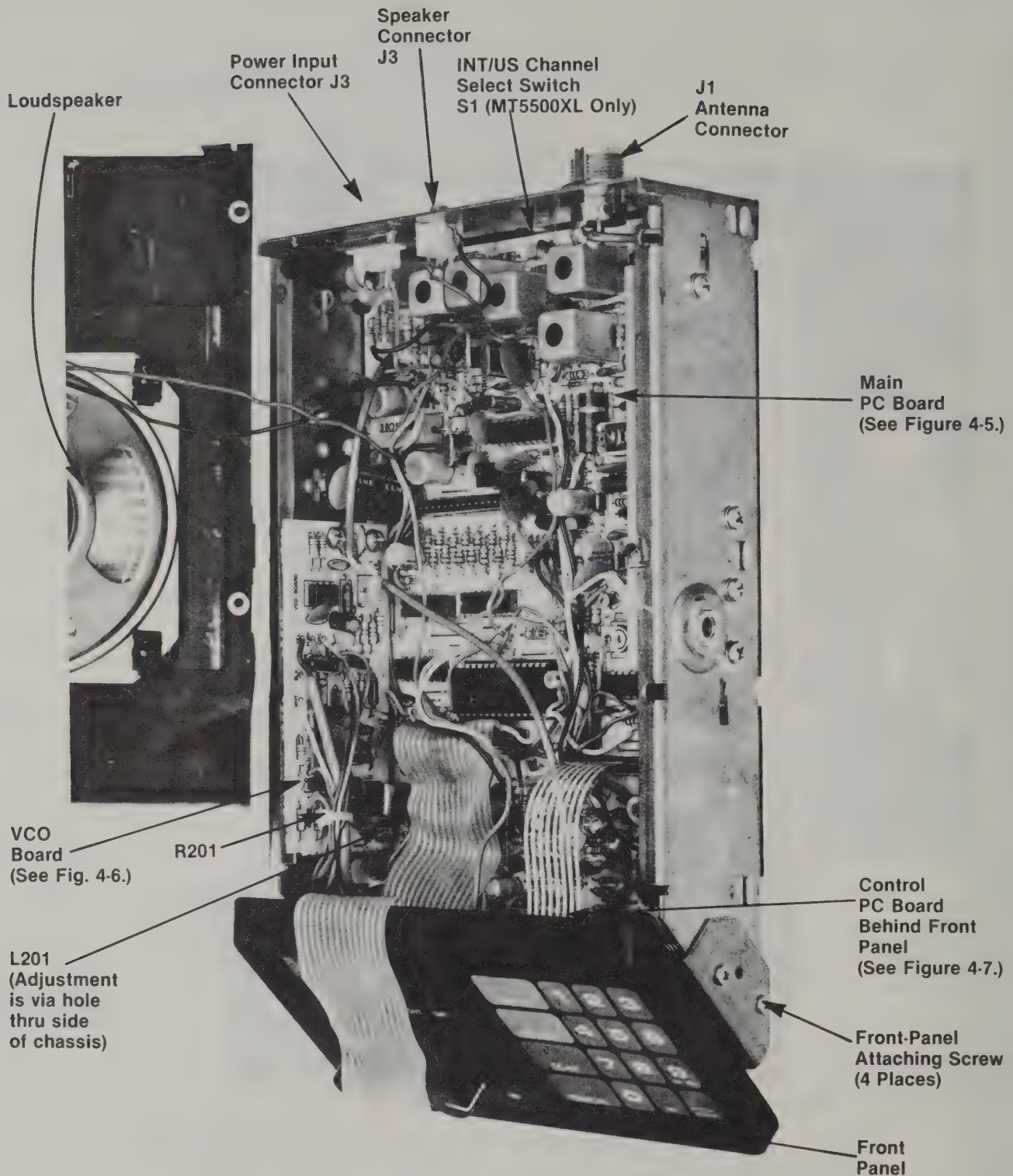
4.4.1 Tuning:

1. Set DC Voltmeter on 2V range.
2. Tune L401 and L402 for a peak DC voltage at M6.
3. Tune L403 for a null DC voltage at M6.
4. Tune L404 for a peak DC voltage at M6.
5. Adjust C442, C446, C454 and C455 for maximum power output.
6. Repeat Step 2.
7. Tune L403 and L404 for maximum power output.
8. Adjust C442, C446, C454 and C455 for maximum power output.
9. Check for approximately same power on Channel 01 and Channel 88.
10. Set S101 in 1W position, and adjust R460 for .9W power output on Channel 16.



NOTE: Also see Figures 4-5 — 4-7 for PC Board Component Placement.

Figure 4-1. Transmitter Alignment: Location of Components Called out in Procedure.



NOTE: Also see Figures 4-6 for PC Board Component Placement.

**Figure 4-2. Transmitter Alignment and Receiver Tuning:
Location of Components Called out in Procedure.**

4.4.2 Transmitter Audio Alignment:

1. Connect an audio generator, set at 1 kHz, to the microphone matching circuit (See Figure 4-3). Set the output level for 1V RMS.
2. Adjust R414 (dev. adj.) for ± 5 kHz deviation maximum.
3. Connect microphone to unit and re-check power output.

4.4.3 Transmitter Frequency Adjustment:

Adjust C468 for proper transmitter frequency (156.800 MHz for Channel 16).

NOTE: After the transmitter and receiver are both tuned, the final setting in the receive mode of the VCO voltage on R201 should be 7.8V on Channel 28.

4.5 Receiver Tuning

- a. This procedure is accomplished in three stages:
 - (1) Local Oscillator
 - (2) Intermediate Frequency (IF)
 - (3) Front End
- b. Refer to Figures 3-3, 4-2 and 4-4 for location of components referred to in these procedures.

NOTE: Prior to the procedures, make the following adjustments:

- (1) Adjust L201 through the hole on the left side of the radio to 7.8 VDC on R201 on Channel 28.
- (2) Set receiver local oscillator frequency on Channel 28 with a counter through 27 pF on M4 to 151.3000 MHz.
- (3) Set the cores of L301, L302, L303, L304, L305 and L306 to the top of the coils.

4.5.1 Load Oscillator:

1. Tune L305 for a dip on M2 on Channel 29.
2. Tune L306 for a peak on M3 on Channel 29.
3. Repeat steps 1 and 2.
4. Tune primarily L306 but also possibly L305 so that M3 will read above 1.0 VDC on Channels 00, 01, 28 and 29.

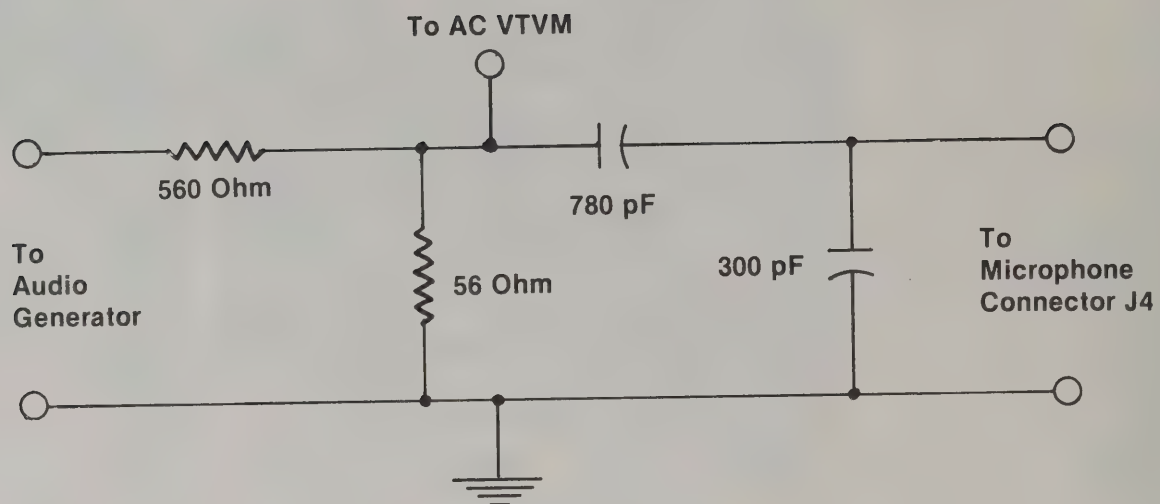
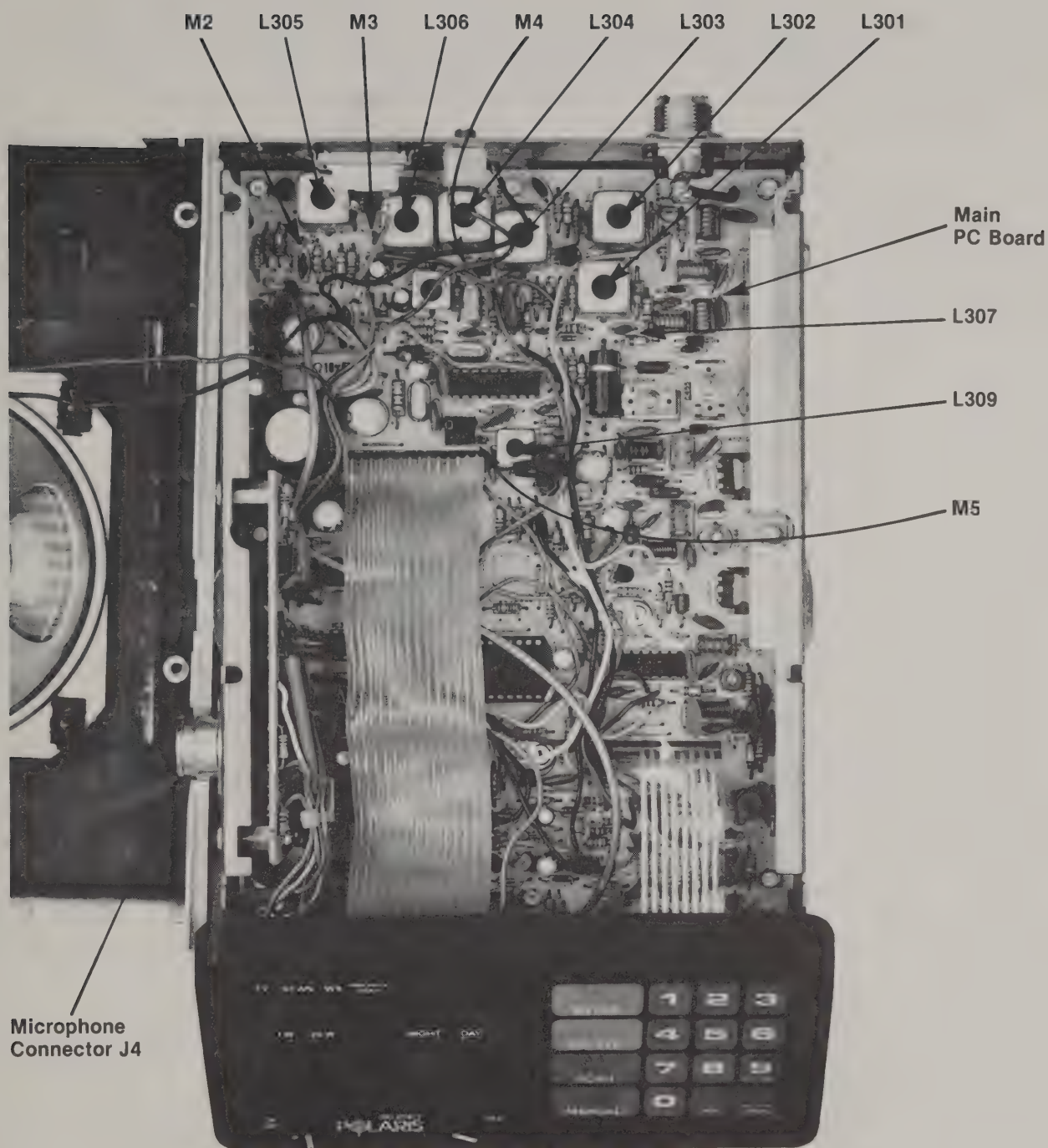


Figure 4-3. Microphone Matching Circuit.



NOTE: See Figure 4-5 for PC Board Component Placement.

Figure 4-4. Receiver Alignment: Location of Components Called out in Procedure.

4.5.2

IF:

1. Adjust L307 for peak reading with scope on M5; best tuning level on M5 is approximately 100 mV P.P.
2. Modulate the RF generator with 1 kHz tone and 3 kHz deviation and adjust volume control for approximately 1V RMS across the speaker. Increase generator level to 1 mV. Tune L309 for peak audio output on RMS voltmeter.

4.5.3

Front End:

1. Unsquench the receiver and attach a RMS voltmeter across the speaker. Adjust volume control to a comfortable noise level. Note reference noise level.
2. Connect an RF generator to the antenna connector; set at the correct frequency per the following steps. Increase the level until approximately 15 dB quieting is obtained. While tuning, adjust RF generator level to keep approximately 15 to 20 dB quieting.
3. Tune L301 and L302 for minimum noise on Channel 01.
4. Tune L303 and L304 for minimum noise on Channel 29.
5. Tune L302 for minimum noise on Channel 29.
6. Tune L301 and L302 for minimum noise on Channel 01.
7. If a beat note is heard, adjust L305 inward slightly and the beat note should be reduced.
8. Tune primarily L303 but also possibly L304 for best quieting on Channel 28.
9. Tune L301 so equal quieting is obtained on Channels 00 and 28.

NOTE: After the transmitter and receiver are both tuned, the final setting in the receive mode of the VCO voltage on R201 should be 7.8V on Channel 28.

4.6

Normal Operating Voltages

Refer to the schematic (Figure 3-2) for voltages at various circuit points for receive and transmit conditions.

4.7

Replacement Parts List

a. The following gives the arrangement of replacement parts:

ITEM	PART NO.	TABLE NO.	FIGURE NO.
Main PCB Assy	7011-1264-400	4-1	4-5
VCO PCB Assy	7011-1263-700	4-2	4-6
Control PCB Assy	7011-1264-100	4-3	4-7
Others		4-4	

b. Parts location conforms to the following nomenclature:

PART NO.	LOCATION
0-99	Chassis
100-199	Control PC Board
200-299	VCO PC Board
300-399	Receiver Section, Main PC Board
400-499	Transmitter Section, Main PC Board

c. All capacitors (C) are pF unless otherwise noted; all resistors (R) are in ohms, 1/4W, 5% unless otherwise indicated.

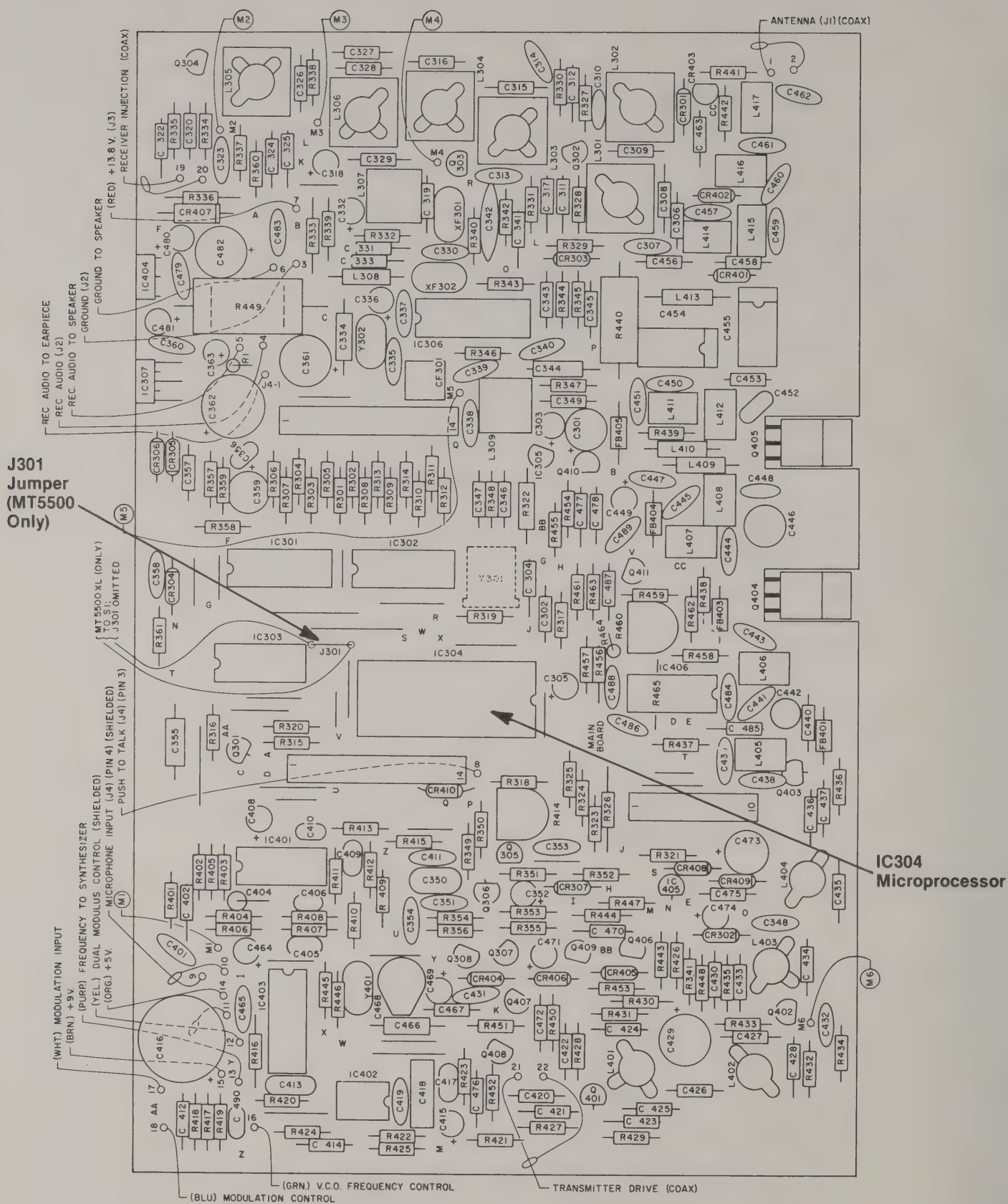


Figure 4-5A. Parts Placement, Main PCB Assembly: Top View.

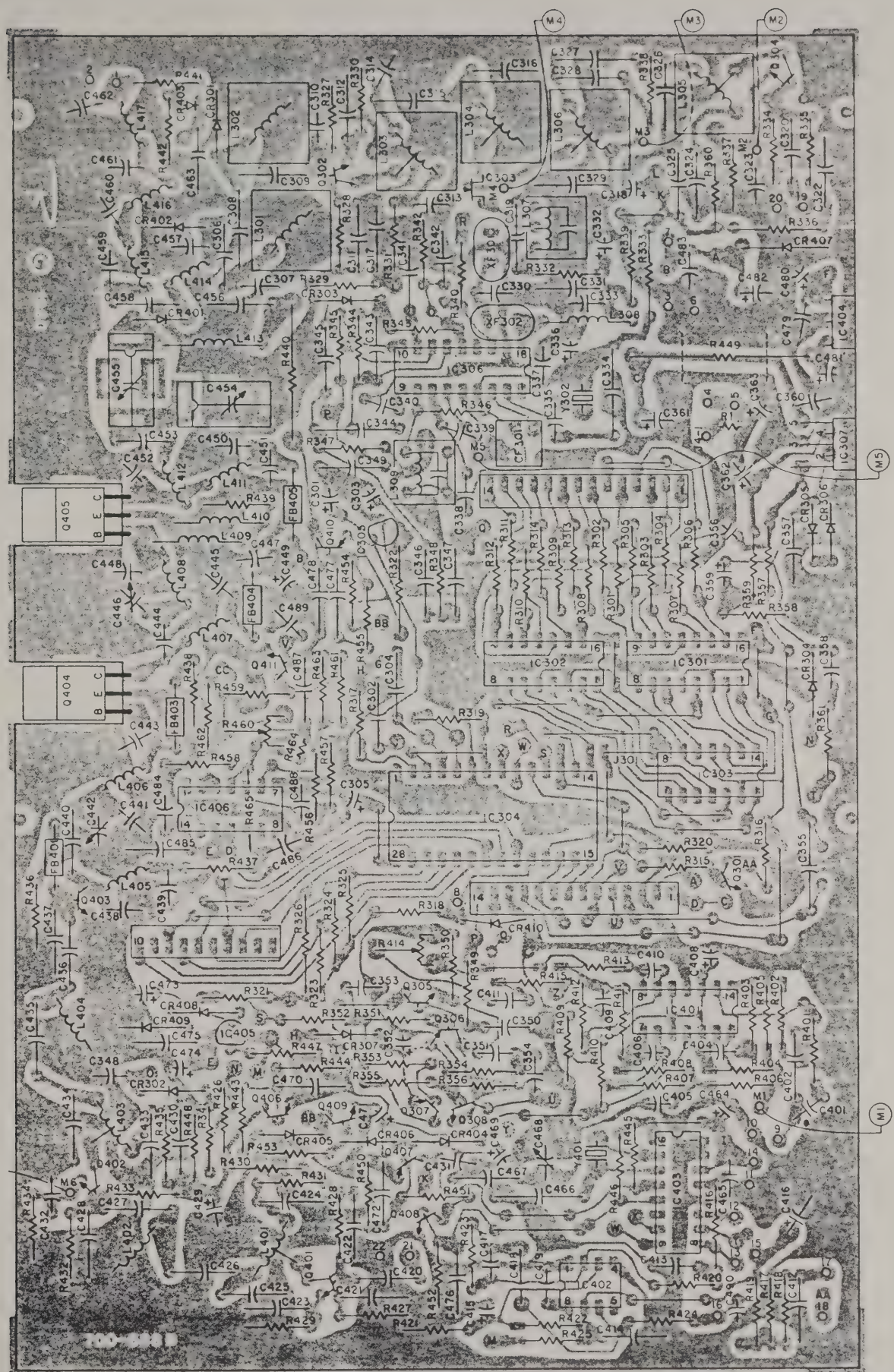


Figure 4-5B. Parts Placement, Main PCB Assembly; Bottom View.

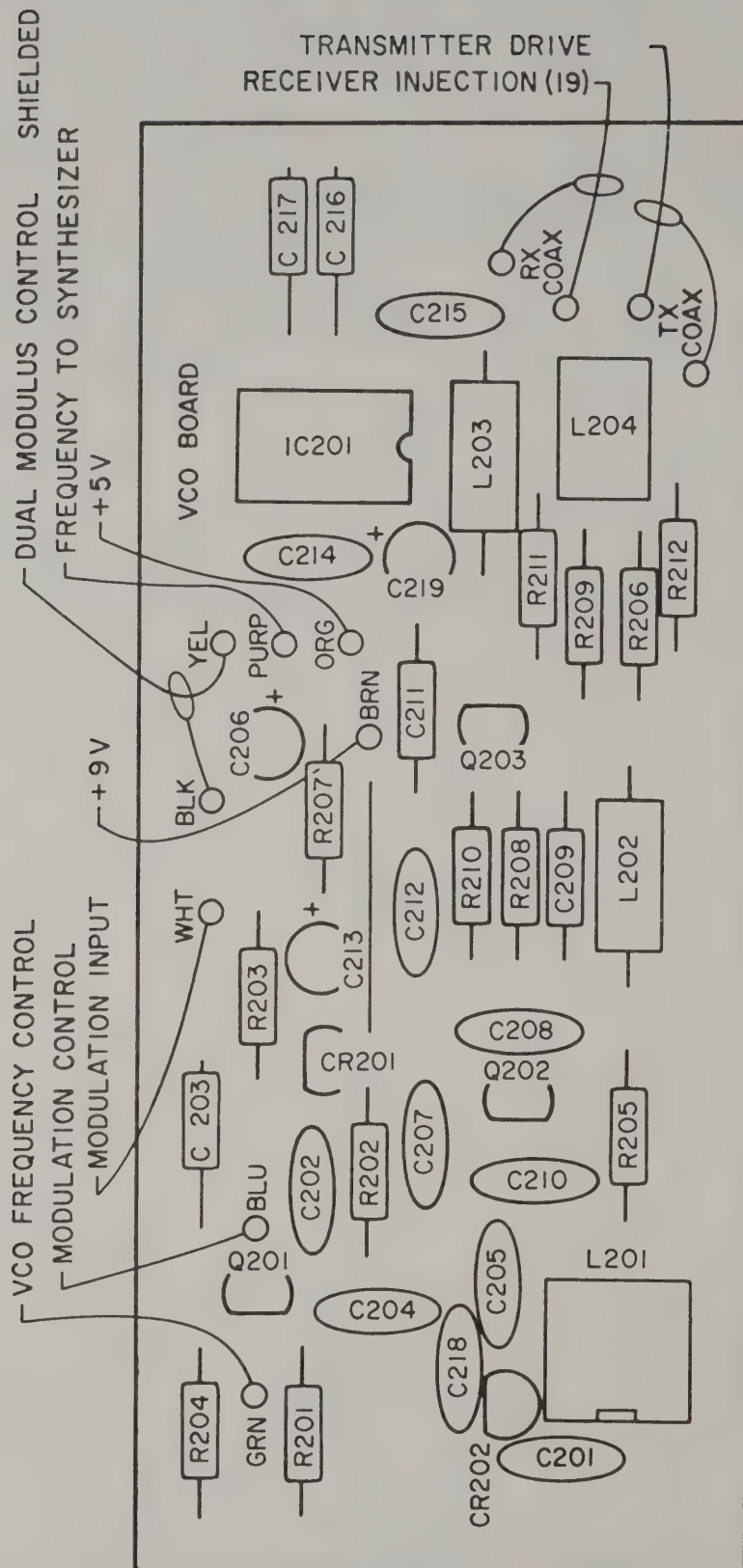


Figure 4-6A. Parts Placement, VCO PCB Assembly; Top View.

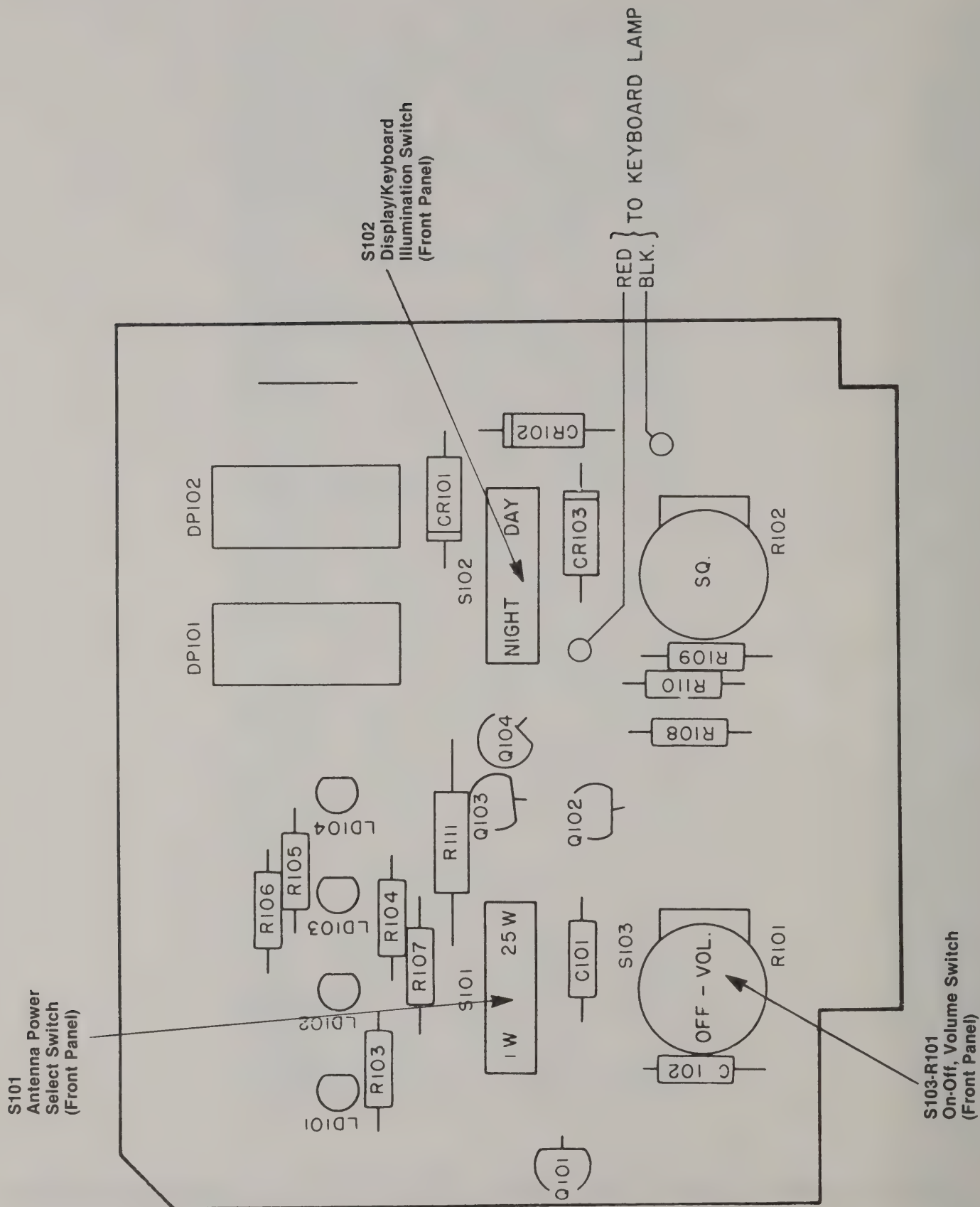


Figure 4-7A. Parts Placement, Control PCB Assembly; Top View.

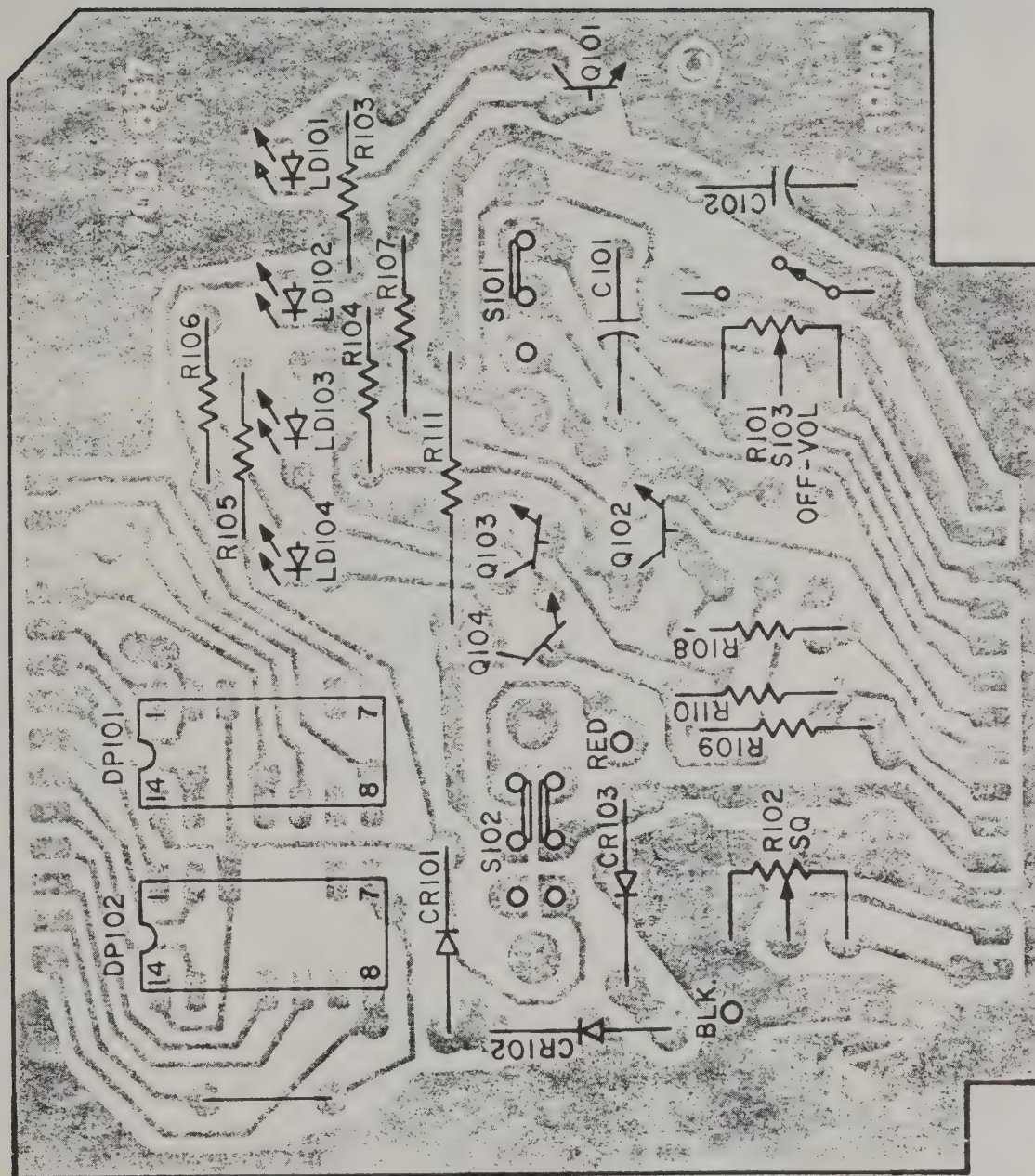


Figure 4-7B. Parts Placement, Control PCB Assembly; Bottom View.

TABLE 4-1. Replacement Parts List, Main PC Board Assembly (See Figure 4-5).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
	<u>CAPACITORS</u>	
C301	1513-3254-709	470 MF, 6.3V, Lytic
C302	1538-0102-601	1000, Disc
C303	1513-0010-004	1 MF, 50V, Lytic
C304	1538-0120-508	12, 5%, NPO
C305	1513-3302-005	.47 MF, 50V, Lytic
C306	1538-0279-608	2.7, 10%, NPO
C307	1500-0829-505	8.2, 5%, NPO
C308	1510-0688-900	.68, 10%
C309	1538-0120-508	12, 5%, NPO
C310	1524-0560-002	56, 5%, NPO
C311	1538-0103-804	.01 MF
C312	1538-0471-601	470
C313	1523-0471-002	470
C314	1500-0090-505	9, NPO
C315	1510-0568-900	.56, 10%
C316	1538-0689-608	6.8, 10%, NPO
C317	1538-0103-804	.01 MF
C318	1513-0100-002	10 MF/16V Lytic
C319	1538-0103-804	.01 MF
C320	1538-0102-601	1000
C321	—	Not Used
C322	1538-0103-804	.01 MF
C323	1523-0471-002	470
C324	1538-0471-601	470
C325	1538-0103-804	.01 MF
C326	1538-0689-608	6.8, 10%, NPO
C327	1510-0568-900	.56
C328	1538-0829-608	8.2, 10%, NPO
C329	1538-0103-804	.01 MF
C330	1500-0399-205	3.9, NPO
C331	1538-0103-804	.01 MF
C332	1513-0100-002	10 MF/16V, Lytic
C333	1538-0103-804	.01 MF
C334	1538-0680-509	68, 5%, NPO
C335	1523-0151-002	150
C336	1513-0220-001	22 MF/10V, Lytic
C337	1502-0503-003	.05 MF
C338	1502-0503-003	.05 MF
C339	1502-0503-003	.05 MF
C340	1523-0151-002	150
C341	1538-0102-601	1000
C342	1502-0474-006	.47 MF
C343	1538-0472-626	4700
C344	1538-0680-509	68, 5%, NPO
C345	1538-0102-601	1000

TABLE 4-1. Continued

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C346	1538-0102-601	1000
C347	1538-0102-601	1000
C348	1523-0471-002	470
C349	1538-0102-601	1000
C350	1508-0683-610	.068 MF, Mylar
C351	1502-0104-005	.1 MF
C352	1513-0100-002	10 MF/16V Lytic
C353	1502-0204-006	.2 MF
C354	1502-0104-005	.1 MF
C355	1538-0223-805	.022 MF
C356	1508-0272-610	2700, Mylar
C357	1538-0103-804	.01 MF
C358	1502-0104-005	.1 MF
C359	1513-0101-001	100 MF/10V, Lytic
C360	1502-0503-004	.05 MF
C361	1513-3254-711	220 MF/16V, Lytic
C362	1513-0102-002	1000 MF/16V, Lytic
C363	1513-3302-005	.47 MF/50V, Lytic
C364	1502-0204-006	.2 MF
C401	1502-0204-006	.2 MF
C402	1538-0151-601	150
C403	1523-0471-002	470
C404	1538-0223-805	.022 MF
C405	1508-0153-510	.015 MF, Mylar
C406	1508-0472-510	4700, Mylar
C407	1523-0471-002	470
C408	1513-0100-002	10 MF/16V, Lytic
C409	1508-0153-510	.015 MF, Mylar
C410	1508-0102-510	1000 MF, Mylar
C411	1502-0204-006	.2 MF
C412	1538-0471-601	470
C413	1508-0683-610	.068 MF, Mylar
C414	1538-0471-601	470
C415	1513-0100-002	10 MF/16V, Lytic
C416	1513-3254-704	1000 MF/16V, Lytic
C417	1508-0153-510	.015 MF, Mylar
C418	1508-3300-302	.22 MF, Film
C419	1523-0471-002	470
C420	1538-0471-601	470
C421	1538-0689-608	6.8, 10%, NPO
C422	1538-0471-601	470
C423	1538-0471-601	470
C424	1538-0471-601	470
C425	1538-0339-608	3.3, 10%, NPO
C426	1510-0398-900	.39 MUD
C427	1538-0689-608	6.8, 10%, NPO
C428	1538-0399-608	3.9, 10%, NPO

TABLE 4-1 Continued

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C429	1513-0101-002	100 MF/16V, Lytic
C430	1538-0102-601	1000
C431	1523-0471-002	470
C432	1538-0471-601	470
C433	1538-0471-601	470
C434	1538-0689-608	6.8, 10%, NPO
C435	1510-0478-900	.47 MUD
C436	1538-0829-608	8.2, 10%, NPO
C437	1538-0270-508	27, 5%, NPO
C438	1500-0150-550	15, 5%, NPO
C439	1502-0503-003	.05 MF
C440	1538-0270-508	27, 5%, NPO
C441	1500-0100-650	10, NPO
C442	1517-3295-303	Trimmer, 6-20 PF
C443	1500-0270-550	27, 5%, NPO
C444	1500-0180-505	18, 5%, NPO
C445	1523-0471-002	470
C446	1517-0000-001	Trimmer, 2-18 PF
C447	1523-0471-002	470
C448	1524-0560-002	56, 5%, NPO
C449	1513-0100-003	10 MF/25V, Lytic
C450	1502-0503-004	.05 MF
C451	1523-0471-002	470
C452	1524-0680-002	68, 5%, NPO
C453	1539-0391-601	390, 10%, NPO
C454	1517-0000-044	Trimmer, 12-65 PF
C455	1517-0000-044	Trimmer, 12-65 PF
C456	1538-0471-601	470
C457	1500-0180-505	18, 5%, NPO
C458	1539-0391-601	390, 10%, NPO
C459	1500-0300-505	30, 5%, NPO
C460	1500-0330-505	33, 5%, NPO
C461	1500-0330-505	33, 5%, NPO
C462	1500-0200-505	20, 5%, NPO
C463	1538-0102-601	1000
C464	1513-0470-001	47 MF/10V, Lytic
C465	1502-0503-003	.05 MF
C466	1538-0560-509	56, 5%, NPO
C467	1538-0270-508	27, 5%, NPO
C468	1517-5165-001	Trimmer, 3-12 PF
C469	1513-0339-005	3.3 MF/10V, Lytic
C470	1538-0102-601	1000
C471	1513-0010-004	1.0 MF/50V, Lytic
C472	1538-0102-601	1000
C473	1513-3254-709	470 MF/6.3V
C474	1513-0010-004	1.0 MF/50V, Lytic

TABLE 4-1. Continued

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
C475	1538-0102-601	1000
C476	1538-0102-601	1000
C477	1538-0102-601	1000
C478	1538-0471-601	470
C479	1502-0503-003	.05 MF
C480	1513-0100-002	10 MF/16V, Lytic
C481	1513-3302-004	10 MF/16V, Lytic
C482	1513-3254-711	220 MF/16V, Lytic
C483	1523-0471-002	470
C484	1502-0503-003	.05
C485	1538-0471-601	470
C486	1523-0471-002	470
C487	1538-0471-601	470
C488	1523-0471-002	470
C489	1502-0503-003	.05 MF
C490	1508-0153-510	.015 MF, Mylar
CF301	2700-3209-500	Filter, Ceramic; 455 kHz
	<u>DIODES</u>	
CR301	4805-1241-200	Silicon
CR302	4805-1241-200	Silicon
CR303	4805-1241-200	Silicon
CR304	4805-1241-200	Silicon
CR305	4805-1241-200	Silicon
CR306	4805-1241-200	Silicon
CR307	4805-1241-200	Silicon
CR401	4815-3408-600	Pin
CR402	4815-3408-600	Pin
CR403	4816-3302-200	Hot Carrier
CR404	4805-1241-200	Silicon
CR405	4805-1241-200	Silicon
CR406	4805-1241-200	Silicon
CR407	4806-0000-004	Silicon, Power
CR408	4805-1241-200	Silicon
CR409	4805-1241-200	Silicon
CR410	4807-1233-900	Germanium
FB301	2502-0000-001	Ferrite Bead
FB401	2502-3293-901	Ferrite Bead/Leads
FB402	2502-0000-003	Ferrite Bead
FB403	2502-3293-901	Ferrite Bead/Leads
FB404	2502-3293-901	Ferrite Bead/Leads
FB405	2502-3293-901	Ferrite Bead/Leads

TABLE 4-1, Continued

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
INTEGRATED CIRCUITS		
IC301	3130-3193-531	Display Driver
IC302	3130-3193-531	Display Driver
IC303	3130-3157-636	Logic <i>74LS164</i>
IC304	3130-6073-303	Processor
IC305	3130-0000-028	Regulator, 5V <i>ECG 866</i>
IC306	3130-6056-500	IF <i>TDA 2003</i>
IC307	3130-5407-602	Audio
IC401	3130-3157-637	Op Amp.
IC402	3130-3167-914	Op Amp.
IC403	3130-6068-000	Synthesizer
IC404	3130-0000-022	Regulator, 5V
IC405	3130-0000-021	Regulator, 8V
IC406	3130-3157-655	Regulator, Variable
COILS		
L301	1800-3152-002	Ant. Prim
L302	1800-3152-002	Ant. Sec.
L303	1800-3152-033	RF Output
L304	1800-3152-037	Mixer RF Input
L305	1800-3152-037	Mult. Output
L306	1800-3152-037	Mixer, Inj. Input
L307	1800-6055-902	Mixer Out. 10.7 MHz
L308	1803-3268-201	RF Choke, 39 uhy
L309	1800-6055-801	Quadrature, 455 kHz
L401	1800-3152-035	Mult. Output
L402	1800-3152-020	Amp. Input
L403	1800-3152-034	Amp. Output
L404	1800-3152-020	Buffer Input
L405	1803-5125-912	RF Choke, .16 uhy
L406	1803-5125-906	RF Choke
L407	1803-5125-912	RF Choke
L408	1803-5125-906	RF Choke
L409	1803-3268-210	RF Choke, 1 uhy
L410	1803-3268-210	RF Choke, 1 uhy
L411	1803-5125-913	RF Choke
L412	1803-5125-901	RF Coil
L413	1803-3268-210	RF Choke, 1 uhy
L414	1803-5125-905	RF Coil
L415	1803-5125-905	RF Coil
L416	1803-5125-905	RF Coil
L417	1803-5152-905	RF Coil

TABLE 4-1. Continued

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
	<u>TRANSISTORS</u>	
Q301	4801-0000-016	NPN
Q302	4801-0000-035	NPN, Red Top
Q303	4811-0000-030	FET
Q304	4801-0000-038	NPN, Red Top LL
Q305	4801-0000-016	NPN
Q306	4801-0000-060	PNP, White Top
Q307	4801-0000-060	PNP, White Top
Q308	4801-0000-016	NPN
Q401	4801-0000-035	NPN, Red Top
Q402	4801-0000-035	NPN, Red Top
Q403	4801-0000-030	NPN
Q404	4804-3411-801	NPN, RF Power
Q405	4804-3411-802	NPN, RF Power
Q406	4801-0000-060	PNP, White Top
Q407	4801-0000-060	PNP, White Top
Q408	4801-0000-016	NPN
Q409	4801-0000-016	NPN
Q410	4801-0000-001	PNP
Q411	4801-0000-016	NPN
	<u>RESISTORS</u>	
R301	4704-0101-032	100
R302	4704-0101-032	100
R303	4704-0101-032	100
R304	4704-0101-032	100
R305	4704-0101-032	100
R306	4704-0101-032	100
R307	4704-0101-032	100
R308	4704-0101-032	100
R309	4704-0101-032	100
R310	4704-0101-032	100
R311	4704-0101-032	100
R312	4704-0101-032	100
R313	4704-0101-032	100

TABLE 4-1. Continued

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
R314	4704-0101-032	100
R315	4704-0103-032	10K
R316	4704-0103-032	10K
R317	4704-0271-032	270
R318	4704-0103-032	10K
R319	4709-1872-012	18.7K, 1%
R320	4704-0472-032	4.7K
R321	4704-0103-032	10K
R322	4704-0330-034	33, 10%, 1/2W
R323	4704-0103-032	10K
R324	4704-0103-032	10K
R325	4704-0103-032	10K
R326	4704-0103-032	10K
R327	4704-0822-032	8.2K
R328	4704-0822-032	8.2K
R329	4704-0101-032	100
R330	4704-0681-032	680
R331	4704-0101-032	100
R332	4704-0471-032	470
R333	4704-0101-032	100
R334	4704-0272-032	2.7K
R335	4704-0822-032	8.2K
R336	4704-0101-032	100
R337	4704-0391-032	390
R338	4704-0102-032	1K
R339	4704-0101-032	100
R340	4704-0101-032	100
R341	4704-0222-032	2.2K
R342	4704-0184-032	180K
R343	4704-0473-032	47K
R344	4704-0334-032	330K
R345	4704-0102-032	1K
R346	4704-0683-032	68K
R347	4704-0223-032	22K
R348	4704-0223-032	22K
R349	4704-0103-032	10K
R350	4704-0822-032	8.2K
R351	4704-0471-032	470
R352	4704-0122-032	1.2K
R353	4704-0472-032	4.7K
R354	4704-0683-032	68K
R355	4704-0272-032	2.7K
R356	4704-0472-032	4.7K
R357	4704-0363-032	36K

TABLE 4-1. Continued

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
R358	4704-0279-032	2.7
R359	4704-0221-032	220
R360	4704-0101-032	100
R361	4704-0222-032	2.2K
R401	4704-0363-032	36K
R402	4704-0334-032	330K
R403	4704-0223-032	22K
R404	4704-0334-032	330K
R405	4704-0472-032	4.7K
R406	4704-0223-032	22K
R407	4704-0272-032	2.7K
R408	4704-0153-032	15K
R409	4704-0272-022	2.7K, 2%
R410	4704-0362-022	3.6K, 2%
R411	4704-0223-032	22K
R412	4704-0123-032	12K
R413	4704-0153-032	15K
R414	4751-0103-001	10K Variable
R415	4704-0103-032	10K
R416	4704-0103-032	10K
R417	4704-0473-032	47K
R418	4704-0223-032	22K
R419	4704-0473-032	47K
R420	4704-0103-032	10K
R421	4704-0222-032	2.2K
R422	4704-0682-032	6.8K
R423	4704-0153-032	15K
R424	4704-0103-032	10K
R425	4704-0390-032	39
R426	4704-0222-032	2.2K
R427	4704-0222-032	2.2K
R428	4704-0103-032	10K
R429	4704-0221-032	220
R430	4704-0100-032	10
R431	4704-0101-032	100
R432	4704-0122-032	1.2K
R433	4704-0682-032	6.8K
R434	4704-0390-032	39
R435	4704-0100-032	10
R436	4704-0560-032	56
R437	4704-0100-032	10
R438	4704-0100-032	10
R439	4704-0100-032	10
R440	4701-0151-046	150, 10%, 2W

TABLE 4-1• Continued

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
R441	4704-0472-032	4.7K
R442	4704-0182-032	1.8K
R443	4704-0222-032	2.2K
R444	4704-0103-032	10K
R445	4704-0822-032	8.2K
R446	4704-0103-032	10K
R447	4704-0222-032	2.2K
R448	4704-0102-032	1K
R449	4707-0399-043	3.9, 10%, 5W
R450	4704-0103-032	10K
R451	4704-0222-032	2.2K
R452	4704-0103-032	10K
R453	4704-0683-032	68K
R454	4704-0122-032	1.2K
R455	4704-0103-032	10K
R456	4704-0222-032	2.2K
R457	4704-0102-032	1K
R458	4704-0681-032	680
R459	4704-0101-032	100
R460	4751-0102-012	10K, Variable
R461	4704-0153-032	15K
R462	4704-0392-032	3.9K
R463	4704-0103-032	10K
R464	4704-0562-032	5.6K Ohm, 5%, 1/4W
R465	4704-0184-032	180K Ohm, 5%, 1/4W
	<u>SWITCHES</u>	
S101	5113-5154-001	Slide, SPDT, 25W/1W
S102	5113-5152-301	Slide, DPDT Day/Night
S103	—	Part of R101
	<u>FILTERS</u>	
XF301	2705-3232-200	Filter, Crystal, 10.7 MHz
XF302	2705-3232-200	Filter, Crystal, 10.7 MHz
	<u>CRYSTALS</u>	
Y302	2301-3151-601	Crystal, 10.245 MHz
Y401	2338-3283-205	Crystal, 11.0 MHz

TABLE 4-2 · Replacement Parts List, VCO PC Board Assembly (See Figure 4-6).

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
	<u>CAPACITORS</u>	
C201	1523-0471-002	470
C202	1500-0229-205	2.2 NPO
C203	1538-0102-601	1000
C204	1500-0090-505	9
C205	1523-0471-002	470
C206	1513-0100-002	10 MF/16V, Lytic
C207	1523-0102-002	1000
C208	1500-0689-505	6.8, 5%, NPO
C209	1538-0471-601	470
C210	1500-0829-505	8.2, 5%, NPO
C211	1538-0471-601	470
C212	1523-0102-002	1000
C213	1513-0100-002	10 MF/16V, Lytic
C214	1502-0503-003	.05 MF
C215	1500-0479-905	4.7, 10%, NPO
C216	1538-0102-601	1000
C217	1538-0102-601	1000
C218	1500-0100-650	10, 10%, NPO
C219	1513-0100-002	10 MF, 16V, Lytic
	<u>DIODES</u>	
CR201	4809-0000-001	Varactor
CR202	4809-0000-011	Varactor
	<u>INTEGRATED CIRCUIT</u>	
IC201	3130-6060-605	Counter, Dual Modulus
	<u>COILS</u>	
L201	1800-5149-704	VCO
L202	1803-3268-211	RF Choke, 4.7 uhy
L203	1803-3268-210	RF Choke, 1.0 uhy
L204	1803-5125-902	RF Choke
	<u>TRANSISTORS</u>	
Q201	4801-0000-016	NPN
Q202	4811-0000-020	FET
Q203	4801-0000-035	NPN, Red Top

TABLE 4-2 Continued

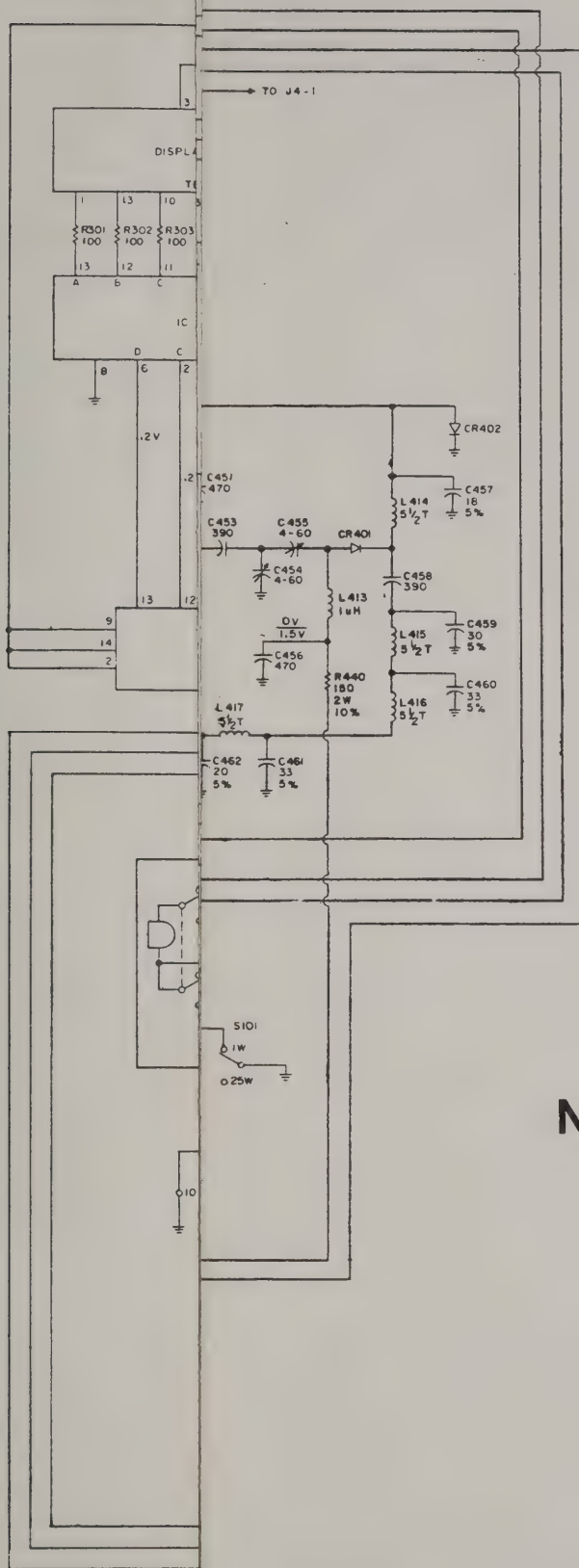
ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
	<u>RESISTORS</u>	
R201	4704-0223-032	22K
R202	4704-0472-032	4.7K
R203	4704-0473-032	47K
R204	4704-0103-032	10K
R205	4704-0274-032	270K
R206	4704-0102-032	1K
R207	4704-0330-032	33
R208	4704-0103-032	10K
R209	4704-0472-032	4.7K
R210	4704-0101-032	100
R211	4704-0680-032	68
R212	4704-0181-032	180

TABLE 4-3. Replacement Parts List, Control PC Board Assembly (See Figure 4-7).

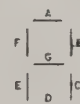
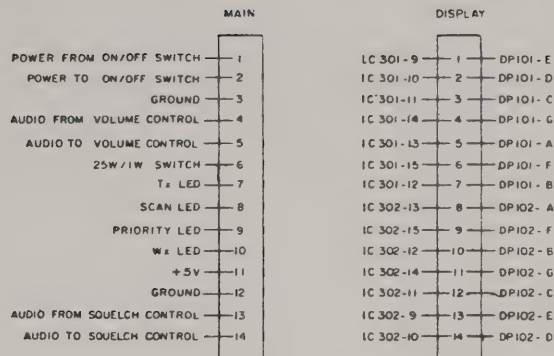
ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
	<u>CAPACITORS</u>	
C101	1538-0102-601	1000
C102	1538-0103-804	.01 MF
	<u>DIODES</u>	
CR101	4806-0000-004	Silicon, Power
CR102	4806-0000-004	Silicon, Power
CR103	4806-0000-004	Silicon, Power
LD101	4810-1333-801	LED, Red
LD102	4810-1320-501	LED, Yellow
LD103	4810-1320-501	LED, Yellow
LD104	4810-1320-501	LED, Yellow
	<u>DISPLAY</u>	
DP101	2000-3285-600	One Digit, Yellow
DP102	2000-3285-600	One Digit, Yellow
	<u>TRANSISTORS</u>	
Q101	4801-0000-016	NPN
Q102	4801-0000-016	NPN
Q103	4801-0000-016	NPN
Q104	4801-0000-016	NPN
	<u>RESISTORS</u>	
R101	4751-3294-801	Variable, 10K Volume with Switch, S103
R102	4751-3278-101	Variable, 10K, Squelch
R103	4704-0101-032	100
R104	4704-0101-032	100
R105	4704-0101-032	100
R106	4704-0101-032	100
R107	4704-0472-032	4.7K
R108	4704-0472-032	4.7K
R109	4704-0472-032	4.7K
R110	4704-0472-032	4.7K
R111	4711-0560-049	56, 1W, 10%

TABLE 4-4 • Replacement Parts List, Miscellaneous Items.

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
	<u>ELECTRICAL PARTS</u>	
— SPK1	1300-6069-902	Microphone Assembly
—	1301-3317-201	Speaker, 3.2 Ohms, 4 In. Square
KB1	1301-3299-603	Alternate Speaker
—	2001-6066-703	Keyboard
C1	3901-0000-011	Lamp, Keyboard, GE 2162D
C2	1523-0471-002	470 PF
J1	1538-0390-608	39 PF, 10%, NPO
J2	2105-0000-056	Antenna Connector
J3	2101-3262-400	Jack, 3.5 mm, Ext. Spkr.
—	2109-5120-403	Power Connector
J4	2107-3244-102	Pins for J3
—	2105-0000-023	Connector, Mic. 5 Pin
—	7011-1218-700	Power Cord
—	2105-3299-202	14 Pin Connector
—	2105-3286-402	10 Pin Connector
R1	6008-3300-003	14 Conductor Cable
S1 (MT5500XL Only)	4704-0681-032	680 Ohm, 5% 1/4W
	5114-5234-101	Switch, Toggle
	<u>CABINET PARTS</u>	
—	2402-6067-201	Knob, Vol. & Squelch
—	1411-7059-803	Front Panel Less Lens
—	1411-5178-401	Case Top
—	1411-7053-006	Case Bottom
—	2402-5148-702	Knob, Mounting
—	1400-6070-802	Bracket, Mounting
—	7011-1219-500	Hardware Kit, Mounting
—	2830-3318-100	Mic Clip
—	3900-5156-004	Front Panel Lens



MAIN BOARD CONNECTORS



KEYBOARD

ENTER	1	2	3
DELETE	4	5	6
SCAN	7	8	9
MANUAL	0	Wx	Priority CHAN

KEYBOARD

N C	1
N C	2
IC 304-27	3
IC 304-20	4
IC 304-26	5
IC 304-21	6
IC 304-25	7
IC 304-22	8
IC 304-24	9
IC 304-23	10

NOTES:

- ALL RESISTOR VALUES ARE IN OHMS, $\pm 5\%$, $\frac{1}{4}$ WATT, UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN PICO-FARADS, UNLESS OTHERWISE SPECIFIED.
- 'O' SYMBOL IMPLIES CONNECTION THAT LEAVES MAIN BOARD.
- PART NUMBERS INDICATE LOCATION:
 - 0- 99 CHASSIS MOUNTED PARTS
 - 100-199 CONTROL BOARD
 - 200-299 VCO BOARD
 - 300-399 RECEIVER SECTION (MAIN BOARD)
 - 400-499 TRANSMITTER SECTION (MAIN BOARD)
- 'O' DENOTES PIN LOCATED ON PC BOARD.
- EITHER (Y301 & C304) OR (R319) IS USED.
- ALL VOLTAGES ARE NOMINAL ON CHANNEL 16 IN 25W. MODE.
- R319's VALUE MAY BE FACTORY ADJUSTED.
- SI USED ON MT5500XL ONLY
J301 USED ON MT5500 ONLY

Figure 3-

TABLE 4-4 • Replacement Parts List, Miscellaneous Items.

ITEM REFERENCE DESIGNATION	PART NUMBER	DESCRIPTION
	<u>ELECTRICAL PARTS</u>	
— SPK1	1300-6069-902	Microphone Assembly
—	1301-3317-201	Speaker, 3.2 Ohms, 4 In. Square
	1301-3299-603	Alternate Speaker
KB1	2001-6066-703	Keyboard
—	3901-0000-011	Lamp, Keyboard, GE 2162D
C1	1523-0471-002	470 PF
C2	1538-0390-608	39 PF, 10%, NPO
J1	2105-0000-056	Antenna Connector
J2	2101-3262-400	Jack, 3.5 mm, Ext. Spkr.
J3	2109-5120-403	Power Connector
—	2107-3244-102	Pins for J3
J4	2105-0000-023	Connector, Mic. 5 Pin
—	7011-1218-700	Power Cord
—	2105-3299-202	14 Pin Connector
—	2105-3286-402	10 Pin Connector
	6008-3300-003	14 Conductor Cable
R1	4704-0681-032	680 Ohm, 5% 1/4W
S1 (MT5500XL Only)	5114-5234-101	Switch, Toggle
	<u>CABINET PARTS</u>	
—	2402-6067-201	Knob, Vol. & Squelch
—	1411-7059-803	Front Panel Less Lens
—	1411-5178-401	Case Top
—	1411-7053-006	Case Bottom
—	2402-5148-702	Knob, Mounting
—	1400-6070-802	Bracket, Mounting
—	7011-1219-500	Hardware Kit, Mounting
—	2830-3318-100	Mic Clip
—	3900-5156-004	Front Panel Lens

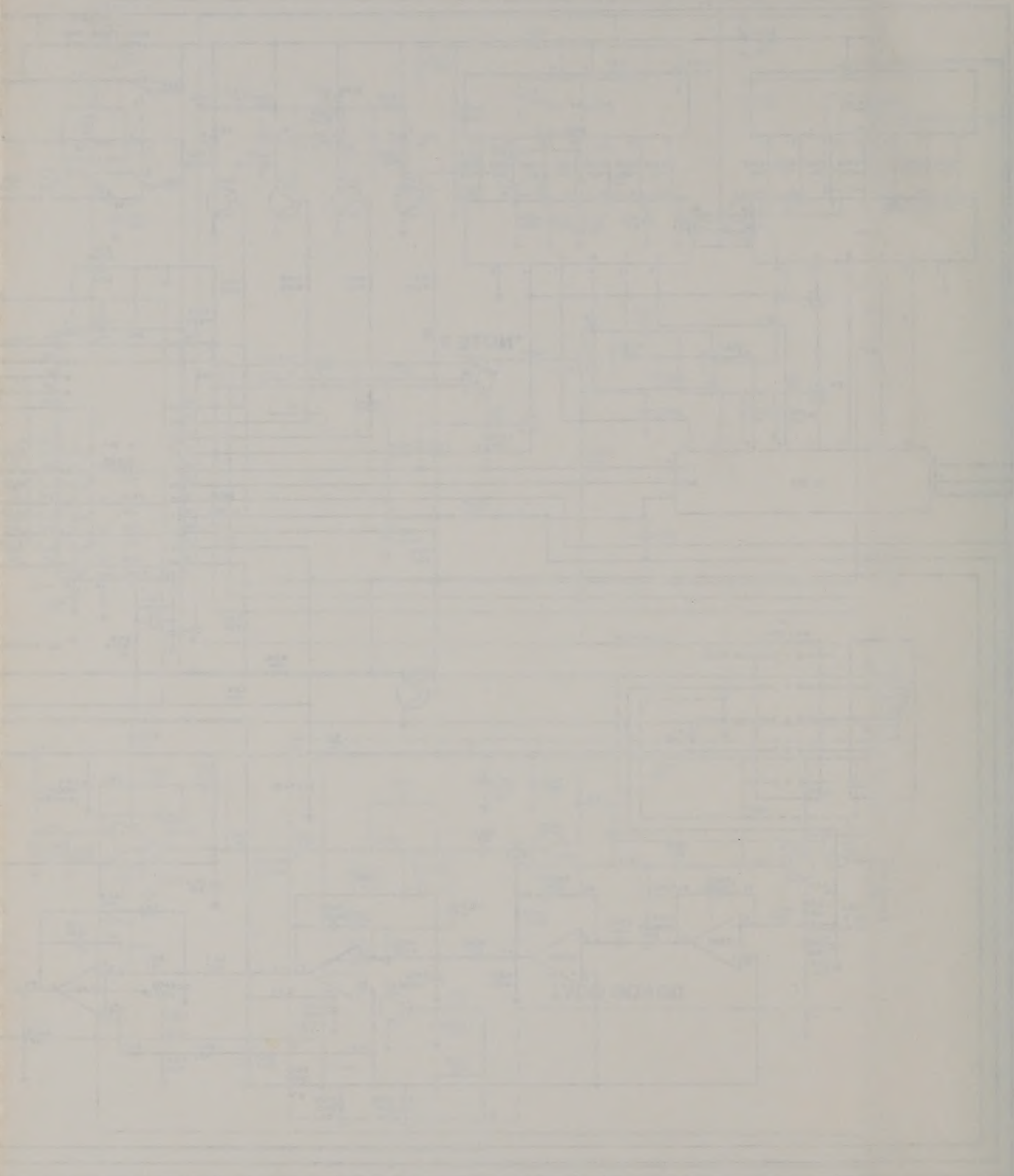


Figure 2-2. Schematic Diagram for Models MT500 and MT500XL Transceivers



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